

RESURRECTION OF *ASCLEPIAS SCHAFFNERI*
(APOCYNACEAE, ASCLEPIADOIDEAE), A RARE, MEXICAN MILKWEED

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ABSTRACT

Relocation and further study of the local endemic *Asclepias zacatecana* McVaugh showed that it is conspecific with *A. schaffneri* A. Gray, a distinct species that previously had been synonymized with *A. quinqueidentata* A. Gray. However, we consider a recently described species, *A. rzedowskii* W.D. Stevens, to be conspecific with *A. quinqueidentata*. *Asclepias schaffneri* is lectotyped.

RESUMEN

El redescubrimiento y estudios consecuentes de *Asclepias zacatecana* McVaugh, una especie endémica de Zacatecas de distribución restringida, muestra que es sinónimo de *A. schaffneri* A. Gray, la cual a su vez ha sido incluida como parte de *A. quinqueidentata* A. Gray. Se discute porqué *A. schaffneri* es diferente de *A. quinqueidentata* y es el nombre correcto para reconocer *A. zacatecana*. Sin embargo, se considera que otra especie recientemente descrita, *A. rzedowskii* W. D. Stevens es a su vez sinónimo de *A. quinqueidentata*. Se lectotipifica *A. schaffneri*.

Key Words: Apocynaceae, Asclepiadoideae, *Asclepias*, lectotype, Mexico, milkweed, taxonomy.

Asclepias zacatecana McVaugh (Apocynaceae) was described from a single collection made by Salvador Correa in 1975 (Correa 25 [MICH]) in the Sierra de Morones of Zacatecas, Mexico (McVaugh 1978). This species has been thought to be a rare, local endemic; prior to the fieldwork reported here, the only other collection known to the authors was made in the same general area in 1971 (Díaz 2356 [ENCB]). In the summer of 2006, we located a population attributable to *A. zacatecana* in this area (Fishbein et al. 5846 [HPSU, MEXU, MO], Juárez-Jaimes et al. 813 [MEXU]), and also discovered populations of what is clearly the same species north of Juventino Rosas, Guanajuato (Juárez-Jaimes 819 [MEXU], Fishbein et al. 5856 [HPSU]). This apparent range extension of 300 km to the southeast prompted further investigation into the distribution and affinities of *A. zacatecana*, the results of which are presented here.

Asclepias zacatecana is most similar to other diminutive, narrow leaved, and small-flowered milkweeds of Mexican highlands, such as *A. fournieri* Woodson, *A. quinqueidentata* A. Gray, *A. rosea* Kunth, and *A. scaposa* Vail, but is readily distinguished by floral and vegetative characteristics. However, specimens identical in every respect to *A. zacatecana* were described by Gray (1880) as *A. schaffneri* A. Gray (*Schaffner* 56 [syntype GH, isosyntype MO] and *Parry & Palmer* 582 [syntype GH]), but this name was

later treated as a synonym of *A. quinqueidentata* by Woodson (1954) in his monograph of North American *Asclepias*. It is worth noting that Parry, who may have been the collector of flowering specimens of milkweeds attributed to “Parry & Palmer” from the vicinity of San Luis Potosí prior to Palmer’s arrival in late July 1878 (McVaugh 1956), recognized two distinct species in these collections when he assigned different catalogue numbers to specimens referable to *A. schaffneri* and *A. quinqueidentata* (582 and 583, respectively). Parry assembled and numbered these collections at his home in Davenport, Iowa in early 1879 (McVaugh 1956), suggesting that his separate numbers may have been based as much on a perceived specific difference as on distinct gatherings in the field. Gray (1880) also explicitly distinguished *Parry & Palmer* 582, one of his syntypes of *A. schaffneri*, from *Parry & Palmer* 583, which he determined to be *A. quinqueidentata*. In the protologue of *A. schaffneri*, Gray compared his new species not to his *A. quinqueidentata*, but to *A. coulteri* A. Gray, a plant of larger stature and flowers that is endemic to calcareous substrates in the Sierra Madre Oriental (Gray 1880).

Gray’s recognition of *A. schaffneri* and *A. quinqueidentata* as distinct species was followed by Hemsley (1881), who observed duplicates of the Parry & Palmer and Schaffner collections at Kew. Vail (1898) added another name based on

these collections by describing *A. palmeri* Vail with *Parry & Palmer 583* as type. She explicitly compared her new species to both *A. quinque-dentata* and *A. schaffneri*, claiming that *A. palmeri* was clearly distinct and intermediate between the other two species, but in an unspecified manner. However, her description of *A. palmeri* is wholly commensurate with the range of variation found in *A. quinque-dentata*. Woodson (1954) followed Gray (1880) in considering *Parry and Palmer 583* to belong to *A. quinque-dentata*, a determination with which we are in agreement. Although not referring specifically to the syntypes of *A. schaffneri*, Woodson (1954:90) noted that specimens collected in San Luis Potosí (the state in which Gray's syntypes were collected) were atypical of *A. quinque-dentata* and perhaps the result of hybridization with *A. coulteri*. Woodson's reasoning is not explicit, though his inference may have been based on the corona of *A. schaffneri* (Fig. 1A), which is more similar in form (but not size) to that of *A. coulteri* (Fig. 1C) than that of *A. quinque-dentata* (Fig. 1D). However, we have found that the three species are easily distinguished by corona morphology alone, in addition to other floral and vegetative characters (Table 1).

Other than some similarity in corona form, there is little reason to attribute the distinctive traits of *A. schaffneri* to hybridization between *A. quinque-dentata* and *A. coulteri*, species that are almost completely allopatric and with very different habitat preferences (Fig. 2). *Asclepias quinque-dentata* is found in grass-dominated openings in oak woods on a variety of substrates, but typically not on limestone, whereas *A. coulteri* is found almost exclusively on limestone outcrops, usually in submontane scrub. *A. schaffneri* is known from an apparent gap in the distribution of *A. quinque-dentata* between Durango and San Luis Potosí, outside the range of *A. coulteri* (Fig. 2). Other than Parry and Palmer's rather vague collecting localities in San Luis Potosí, there is no indication that any pair of these species co-occurs. It should be noted that Woodson (1954) made other unwarranted inferences of hybridization involving poorly known Mexican *Asclepias* (cf. Fishbein and Lynch 1999).

Most recently, *Asclepias rzedowskii* W.D. Stevens, a species described from Estado de México (Stevens 1983), was distinguished from *A. quinque-dentata* by an entire, rather than toothed, upper hood (corona) margin. We have examined specimens of *A. rzedowskii* from the general region of the holotype (the holotype is missing; see below) and conclude that the distinguishing character is, at best, inconstant. We provisionally reduce *A. rzedowskii* to the synonymy of *A. quinque-dentata*.

Our study of the types of *A. quinque-dentata*, *A. schaffneri*, and *A. zacatecana*, in addition to a

large proportion of the few collections of these entities represented in herbaria, supports the recognition of both *A. quinque-dentata* and *A. schaffneri*, the conspecificity of *A. zacatecana* and *A. schaffneri*, and the conspecificity of *A. rzedowskii* and *A. quinque-dentata*. Characters useful in distinguishing *A. schaffneri*, *A. quinque-dentata*, and *A. coulteri* are presented in Table 1 and known localities of these species are shown in Fig. 2.

TAXONOMY

ASCLEPIAS SCHAFFNERI A. Gray, Proc. Amer. Acad. Arts 16:103–104. 1880.—TYPES: MEXICO, San Luis Potosí, mountains near Morales, July 1876, *Schaffner 56* (lectotype, designated here, GH!, isolectotypes, K!, MEXU!, MO!), MEXICO; San Luis Potosí, chiefly in the region of San Luis Potosí, 22° N Lat., 6000–8000 ft., 1878, *Parry & Palmer 582* (syntype, GH!, isosyntypes, K!, MO, 2 sheets!). Fig. 3A.

Asclepias zacatecana McVaugh, Contrib. Univ. Mich. Herb. 11:289. 1978. Syn. nov.—TYPE: MEXICO, Zacatecas, near summits between Jalpa and Tlaltenango, 2400–2500 m, 22 July 1975, *Corea 25* (holotype, MICH!).

Additional specimens seen. MEXICO, GUANAJUATO, Mpio. de Juventino Rosas, Juventino Rosas-Guanajuato road, 23 km north of Juventino Rosas, 2220 m, 6 July 2006, *Juárez-Jaimes et al. 819* (MEXU); Mpio. de Juventino Rosas, 25 km north of Juventino Rosas, 2290 m, 6 July 2006, *Fishbein et al. 5856* (HPSU, MEXU, MO). ZACATECAS, Jalpa-Tlaltenango road, 2100 m, 2 July 1971, *Diaz 2356* (ENCB); Mpio. de Tlaltenango, Sierra de Morones, Tlaltenango-Jalpa road, 27 km southeast of Tlaltenango, 2525 m, 5 July 2006, *Juárez-Jaimes et al. 813* (MEXU), *Fishbein et al. 5846* (HPSU, MEXU); Mpio. de Chalchihuite, southeast end of Sierra Prieta, 3 km north of La Colorada mining area, 30 km south of Sombrerete along gravel roads, 16 km (by air) southeast of Chalchihuite, above 2900 m, 25 July 1982, *Diggs and Nee 3008* (F).

Asclepias schaffneri is endemic to mountains of the central plateau of Mexico, in the states of Guanajuato, San Luis Potosí, and Zacatecas (Fig. 2). The species is documented from pine-oak forest from 2100 to 3000 m. It is apparently quite rare, occurring in small, widely dispersed populations. The plants can easily be overlooked because of their small stature and narrow leaves. *Asclepias schaffneri* should be sought in the adjacent states of Aguascalientes, Durango, Jalisco, and Querétaro where similar habitat occurs.

Gray (1880) cited two syntypes in describing *A. schaffneri*. We have selected the first cited collection, *Schaffner 56*, as a lectotype, because

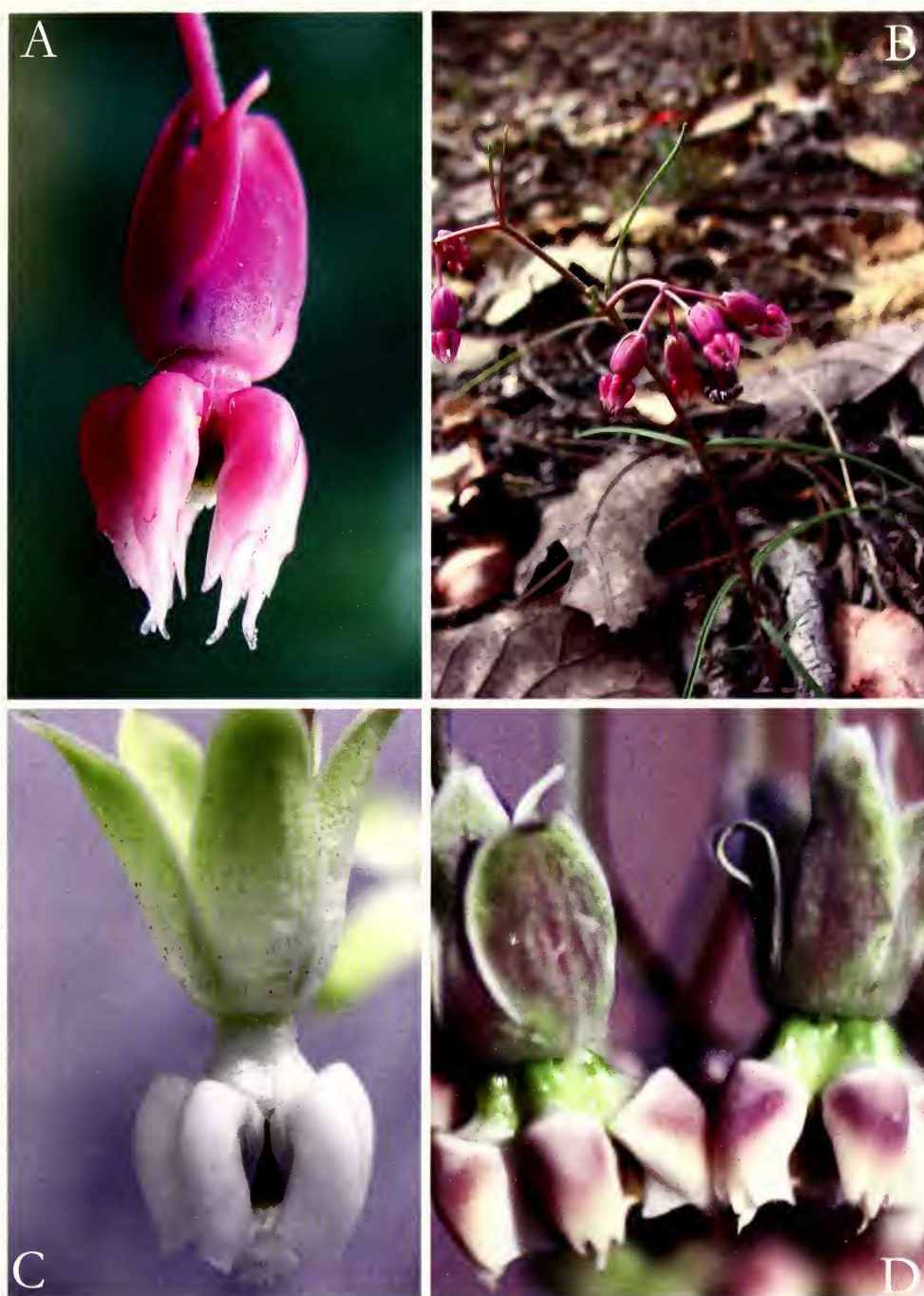


FIG. 1. Comparison of the flowers of *Asclepias schaffneri*, *A. coulteri*, and *A. quinqueidentata*. A. Flower of *A. schaffneri* from a population in the Sierra de Morones, Zacatecas, México (Fishbein et al. 5846). B. Inflorescence of *A. schaffneri* from the same population in Zacatecas. C. Flower of *A. coulteri* from a population in the Sierra Gorda, Querétaro, México (Fishbein et al. 5172). D. Flowers of *A. quinqueidentata* from a population in the Galiuro Mountains, Arizona, USA (Fishbein & King 2850). Photos by M. Fishbein (A, C, D) and L. Alvarado-Cárdenas (B).

it is represented in four major herbaria and because of the epithet chosen by Gray. The other syntype is Parry & Palmer 582. One of the two sheets of Parry & Palmer 582 housed at MO consists of two mature, fruiting specimens. These

were surely collected at a later date than the flowering specimens with the same catalogue number, which are more commonly represented in herbaria. It is quite possible that the fruiting specimens were collected by Palmer, rather than

TABLE 1. DISTINGUISHING CHARACTERS OF *ASCLEPIAS COULTERI*, *A. QUINQUEDENTATA* AND *A. SCHAFFNERI* (see also FIGS. 1, 3).

| Character | <i>A. coulteri</i> | <i>A. quinquedentata</i> | <i>A. schaffneri</i> |
|-----------------------------------|--|--|---|
| Growth form | Sub-shrub with multiple, branched shoots that persist for more than 1 yr | Herbaceous, annually renewed shoots that are basally branched with one to several fertile stems and several short, sterile stems | Herbaceous, annually renewed shoots that are unbranched, with 1–2 fertile stems |
| Inflorescence | Flowers laxly spreading; a few may be pendent | Flowers all pendent | Flowers laxly spreading; a few may be pendent |
| Corolla color | Green | Green, often with reddish or brownish tinge | Pink or magenta |
| Corona color | White | Brown or purplish at base, white at apex | Pink or magenta, paler at apex |
| Corona height | More than twice as tall as anthers | Slightly surpassing anthers | More than twice as tall as anthers |
| Corona appendage ("horn") posture | Strongly incurved over style apex | Strongly incurved over style apex | Erect to slightly incurved |

Parry, who had left San Luis Potosí by August 3, 1878 (McVaugh 1956). The fruits of *A. schaffneri* and *A. quinquedentata* are not sufficiently known to permit definitive determination of the specimens bearing fruits that are mounted on a single sheet at MO. The architecture of the plant on the left side of the sheet is consistent with that of *A. schaffneri*. However, the plant on the right bears two short, sterile branches more suggestive of *A. quinquedentata*. The probability that this sheet represents a mixed collection of the two species is bolstered by the existence of *Parry & Palmer 583*, which consists of bona fide flowering specimens

of *A. quinquedentata*. It is conceivable that Parry erred in compiling the catalogue for the collections when he associated fruiting specimens, which may have been collected by Palmer after Parry's departure from the field, with flowering specimens that Parry may have collected earlier in the year. Other than this putative mixed collection, there is no evidence that these two species ever occur in sympatry.

ASCLEPIAS QUINQUEDENTATA A. Gray, Proc. Amer. Acad. Arts 12:71. 1877.—TYPE: USA, West Texas [sic], on or near the San Pedro

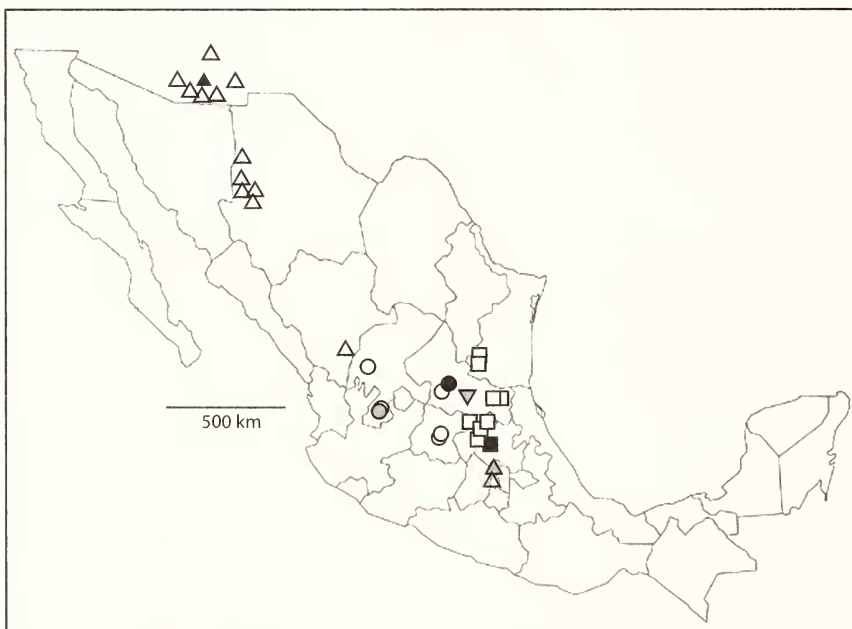


FIG. 2. Approximate collection localities of representative specimens of *A. coulteri* (squares), *A. quinquedentata* (triangles), and *A. schaffneri* (circles). Type localities are indicated as follows: *A. coulteri* (■), *A. quinquedentata* (▲), *A. rzedowskii* (▼), *A. schaffneri* (●), *A. zacatecana* (●).

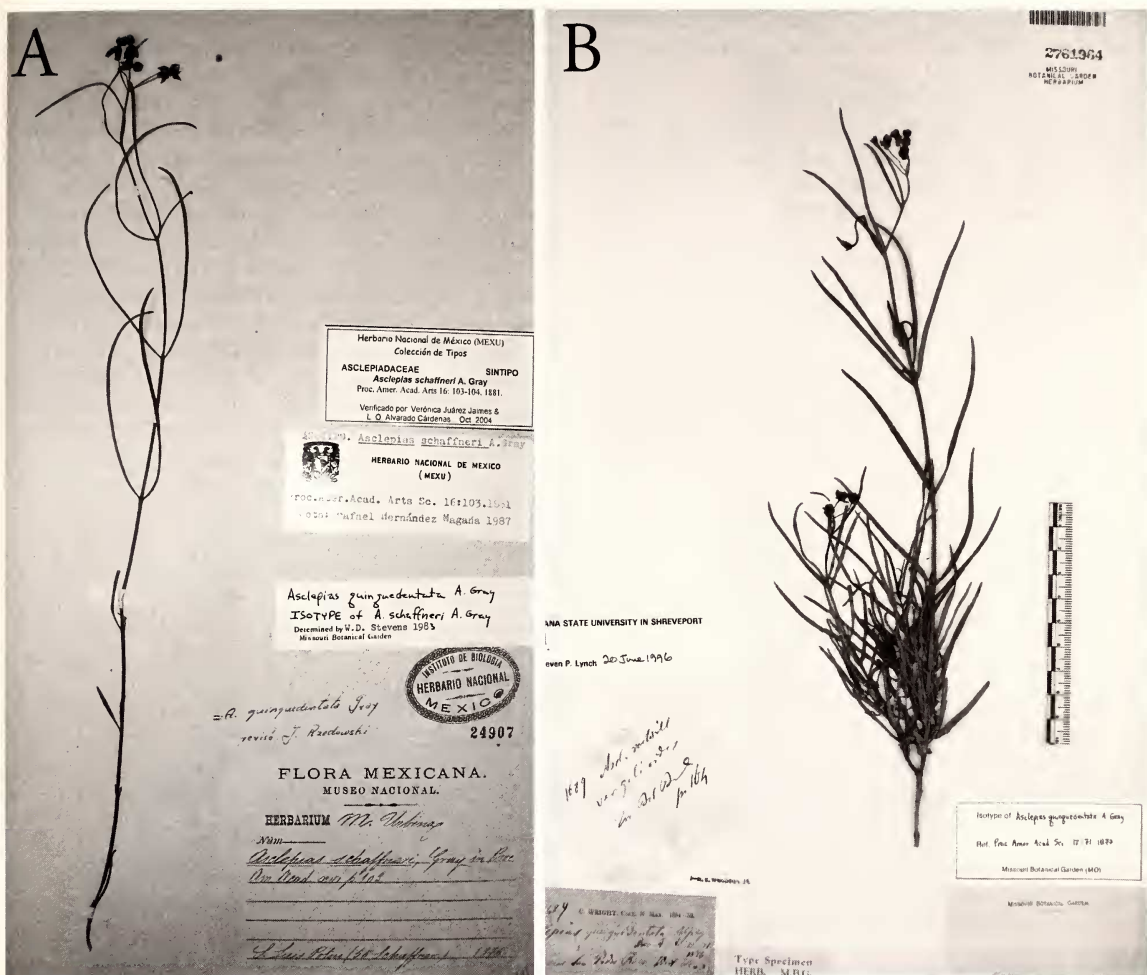


FIG. 3. Type specimens of *Asclepias schaffneri* and *A. quinquedentata*. A. Isolecotype of *A. schaffneri* A. Gray in the Herbario Nacional, Universidad Nacional Autónoma de México (MEXU). B. Isotype of *A. quinquedentata* A. Gray in the Missouri Botanical Garden Herbarium (MO). Photo used by permission of the Missouri Botanical Garden.

River, 1851–2, *C. Wright* 1689 (holotype, GH, not seen, isotypes K!, MO!, US!). Fig. 3B.

Asclepias quinquedentata A. Gray var. *neomexicana* Greene ex A. Gray, Proc. Amer. Acad. Arts 16:103. 1880.—TYPE: USA, New Mexico, rocky mountain-side east of Pinos Altos, 22 June 1880, *Greene s. n.* (holotype, GH, not seen, isotype, MO!).

Asclepias palmeri Vail, Bull. Torr. Bot. Club 25:171–172. 1898.—TYPE: MEXICO, San Luis Potosí, chiefly in the region of San Luis Potosí, 22° N Lat., 6000–8000 ft., 1878, *Parry & Palmer* 583 (holotype, GH!, isotypes, MO!, NY!).

Asclepias amsonioides Standl., Field Mus. Nat. Hist., Bot. Ser. 22:44. 1940.—TYPE: MEXICO, Chihuahua, El Cima, 29 June 1936, *LeSueur* 848 (holotype, F!, isotypes, ARIZ!, GH!, TEX!, US!).

Asclepias rzedowskii W.D. Stevens, Phytologia 53:402–403. 1983. Syn. nov.—TYPE: MEXICO, Estado de México, parte baja de ladera sur del Cerro Sincoque, 2200 m, 15 April 1981, *Romero & Rojas* 34-1193 (holotype, ENCB, not found).

Additional specimens seen. MEXICO, CHIHUAHUA, Sierra Madre, Cusihuiriachic, 30 August 1887, *Pringle s.n.* (MEXU, MO); Sierra Madre, 1899, *Nelson* 6130 (US); Sierra Madre, Colonia Garcia, 11 July 1899, *Townsend & Barber* 125 (US, 2 sheets); Madera, 1908, *Palmer* 321 (U.S.); Mpio. Guerrero, 0.5 mi east of El Alamito, along Arroyo Cueva del Toro, 2230 m, 5 June 1984, *Bye* 12881 (MEXU); Nabogame, 1800 m, 27 August 1987, *Laferrière* 980 (MEXU, MO). DISTRITO FEDERAL, Lomas de la Fè, May 1929, *Lyonnet* 503 (MEXU); Lomas, June 1938, *Lyonnet* 3080 (MEXU, 2

sheets). DURANGO, Mpio. Suchil, Cienega de los Caballos, 2300 m, 10 June 1976, *Martínez 567* (MEXU). ESTADO DE MÉXICO, 3 km west of Río Hondo, 2350 m, 15 April 1973, *Rzedowski 30404* (ENCB). UNITED STATES, ARIZONA, Cochise Co., Chiricahua Mountains, 17 Jun 1960, *McCormick 169A* (ARIZ); Cochise Co., Huachuca Mountains, 2200 m, 12 August 1990, *McLaughlin 6009* (ARIZ); Graham Co., Galiuro Mountains, 1737 m, 7 Nov 1993, *Fishbein et al. 1513* (ARIZ), 1820 m, 28 July 1996, *Fishbein & King 2850* (ARIZ); Pima Co., Rincon Mountains, 1 August 1910, *Thorber s.n.* (ARIZ), 25 July 1982, *Bowers R421* (ARIZ), 13 August 1983, *Bowers R1256* (ARIZ); Pima Co., Santa Rita Mountains, 1554 m, 26 July 1986, *McLaughlin 3744* (ARIZ); Pima Co., Kitt Peak highway, 6.9 mi south of jct with AZ highway 89, 28 July 1988, *McLaughlin 4796* (ARIZ); Santa Cruz Co., Nogales to Ruby, 25 August 1940, *Kearney 14,904* (ARIZ).

Although *A. quinqueidentata* is a widespread species, it is apparently rare throughout its range. It has been found in the Mexican states of Chihuahua, Durango, México, San Luis Potosí, and the Distrito Federal, and in the United States in Arizona and New Mexico, but probably not Texas (see below; Fig. 2). Most collections have been made in southern Arizona and western Chihuahua. The species occurs mostly in open oak woods in mountains and foothills. Like *A. schaffneri*, *A. quinqueidentata* appears to occur in small, widely separated localities and is diminutive and inconspicuous. The species should be sought in apparent gaps in its distribution—between western Chihuahua and southeastern Durango, between Durango and San Luis Potosí, and between San Luis Potosí and Estado de México (Fig. 2). Interestingly, the gap between Durango and San Luis Potosí is occupied by the entirety of the known range of *A. schaffneri*.

Asclepias rzedowskii, described from specimens collected from the southern end of the range of *A. quinqueidentata* in Estado de México (Stevens 1983), is provisionally placed in synonymy. The type was said to differ from *A. quinqueidentata* by an entire upper margin of the hood of the corona (rather than a sharply toothed margin). Southern populations identified as *A. rzedowskii* appear to flower earlier (April–June) than more northerly populations in the main range of *A. quinqueidentata* (June–July); however, this is likely to be a consequence of the earlier onset of the rainy season in the southern region. Although the type of *A. rzedowskii* could not be located at ENCB, we have examined specimens at MEXU collected by Lyonnet in Estado de México that were discussed by Stevens (1983). These specimens bear the toothed upper hood margin characteristic of *A. quinqueidentata* and otherwise conform in all respects to that species. We consider the

variation in hood morphology present in the type specimen of *A. rzedowskii* to be insufficient for species recognition without additional morphological evidence or apparent geographic isolation.

Although the type locality of *A. quinqueidentata* has been thought to be in Texas, it is most probably in Arizona. Gray (1877) cites in the protologue “West Texas, on or near the San Pedro River” as the type locality of *A. quinqueidentata*; a similar location is indicated on the label of the isotype at MO (Fig. 2). Whereas there is no significant watercourse in Texas named San Pedro, there is a San Pedro River in Arizona that was a known collecting locality of Wright in 1851–1852 (Wooton 1906). According to Wright’s field notes, he collected at the San Pedro, or approaching or departing the river, on September 8–12 and again on September 24–29, 1851. These are the only dates in his field notes on which he was at this locality. Of particular note is Wright’s locality “San Pedro (on banks and near)”, listed for Sept. 9–11, which approximates the wording on the specimen labels (Wooton 1906). Furthermore, *A. quinqueidentata* has not been collected subsequently from Texas, but it has been collected repeatedly in southeastern Arizona (and adjacent southwestern New Mexico), including the watershed of the San Pedro River (Fig. 2). According to Wooton (1906), Wright did not collect in Texas in 1851 and collected in Texas, but not Arizona, in 1852. Thus, the most probable place and time of the type collection of *A. quinqueidentata* was on or near the banks of the San Pedro River, Arizona, on Sept. 9–11, 1851.

ASCLEPIAS COULTERI A. Gray, Proc. Amer. Acad. Arts 12:71. 1877.—TYPE: MEXICO, Hidalgo, Zimapan, *Coulter 983* (holotype, GH!, isotypes, K, 2 sheets!).

Asclepias tithymaloïdes Greene, Erythea 1:151. 1893.—TYPE: MEXICO, San Luis Potosí, dry limestone ledges near Los Palmas, 25 Jul. 1891, *Pringle 3786* (holotype, GH!, isotypes, K!, LL, 2 sheets, photo!, MEXU!, TEX, photo!, US, photo!).

Representative specimens. MEXICO, GUANAJUATO, Mpio. Atarjea, Cerro de Veracruz, 1250 m, 16 May 1990, *Ventura 7986* (MEXU, MO, TEX); Mpio. Atarjea, El Banco, 1250 m, 13 June 1991, *Ventura 9241* (MEXU, MO); Mpio. Xichu, 13 km north of Xichu, 900 m, 31 July 1998, *Zamudio 10782* (IEB). HIDALGO, Mpio. San Agustín Tlaxiaco, Barranca de Meztlán, 1300 m, 8 July 1974, *Sánchez 2283* (MEXU), 1800 m, 6 June 1977, *Sánchez 2787* (MEXU); 10 km northwest of Zimapan, 1000 m, 9 August 1965 *Gonzalez s.n.* (LL); Mpio. Zimapan, Casa de Máquinas, 1100 m, 20 May 1992, *Huerta 1621* (MEXU). QUERÉTARO, Mpio. Cadereyta, north of Mesa de Leon, upper part of Río Moctezuma,

1700 m, 12 May 1993, *Zamudio 9041* (IEB); Mpio. Cadereyta, north of La Tinaja, Cañada de la Culebra, 1550 m, 8 June, 1995, *Zamudio 9508* (IEB); 6.5 km north of Mesa de Leon, 1675 m, 4 July 2005, *Steinmann 5133* (HPSU, IEB); Mpio. Jalpan, 9 km south of La Parada, 1400 m, 23 June 1988, *Zamudio 6523* (IEB); Mpio. Jalpan, 3–4 km west of La Parada, 1300 m, 24 May 1991, *Servin 1057* (MO); Mpio. Jalpan, east of Tanchanaquito, 450 m, 20 May 1993, *López 611* (MEXU); Mpio. Landa, 4 km east of La Vuelta, 1400 m, 21 October 1994, *Zamudio 9419* (IEB), 10 June 2002, *Steinmann 2489* (IEB), 25 September 2002, *Zamudio 12128* (IEB), 4 July 2003, *Fishbein 5172* (HPSU, IEB); Mpio. Peñamiller, 1 km west of Peñamiller, 1450 m, 28 July 1977, *Zamudio 2264* (MEXU, MO); Mpio. Peñamiller, 1.5 km west of Rio Blanco, 1600 m, 26 September 2002, *Steinmann 2858* (IEB); Mpio. Toluca, 1 km south of Adjuntillas, 16 June 1978, *Zamudio 2882* (MEXU, MO, TEX). SAN LUIS POTOSI, Minas de San Rafael, June 1911, *Purpus 5215* (MEXU, MO); 6.4 km east of Ciudad Valles, 23 March 1976, *Hansen 3846* (LL, MEXU). TAMAULIPAS, north of Hoja Verde, 1825 m, 22 June 1949, *Stanford 2026* (MO, RSA); Mpio. Victoria, canyon above Ciudad Victoria, road to Jaumave, 31 August 1950, *Sharp 50368* (MEXU); Mpio. Xicotencatl, 14 mi southwest of Ciudad Victoria, 1225 m, 9 June 1962, *Webster 11249* (MEXU, MO); 35 km west of Jaumave, 1650 m, 7 October 1982, *Henrickson 19112b* (TEX).

Asclepias coulteri is a characteristic species of submontane scrub on limestone in the Sierra Madre Oriental, in the states of Guanajuato, Hidalgo, Querétaro, San Luis Potosí, and Tamaulipas (Fig. 2). It is especially notable growing on the faces of limestone cliffs, with its virgate branches and pendulous flowers. Gray's (1877) protologue indicates "Mexico" without a more specific location as to the type locality. One of the two isotypes at K, sheet number 1867 from Hooker's herbarium, indicates that Zimapan,

presumably in Hidalgo, is the locality of Coulter's type collection.

ACKNOWLEDGMENTS

We are grateful for the field assistance and good company of Anna Mercedes Fernández Brewer. We also thank the curators of F, GH, MEXU, MICH, MO, TEX/LL, and U.S. for the provision of loan material and the staff at ARIZ, ENCB, F, K, MEXU, and RSA for hospitality and assistance. The thoughtful comments of two reviewers and the editor, John C. Hunter, substantially improved the manuscript. This paper was written with the support of NSF grant #DEB-0608686 awarded to MF.

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